



Vaccination against *Actinobacillus pleuropneumoniae* as an alternative strategy to antimicrobial use in Danish pig herds.

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43. Vaccination against *Actinobacillus pleuropneumoniae* as an alternative strategy to antimicrobial use in Danish pig herds.

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Abstract

In this study the objective was to determine whether use of vaccination against *Actinobacillus pleuropneumoniae* (APP) had an effect on the antimicrobial consumption in finisher pigs, when compared to herds without vaccination. Based on observational data, we found that the change in antimicrobial consumption after vaccination was initiated was significant associated with the baseline antimicrobial use before vaccination. The decrease in antimicrobial used was more pronounced in vaccinated herds (N=101) when compared to herds without vaccination (N=320), indicating an effect of vaccination against APP on the antimicrobial consumption level.

Introduction

Vaccination has been identified as a potential alternative strategy to antimicrobial use in pigs (Postma *et al.*, 2015). As an example, vaccines against APP has been developed for the prevention of pleuropneumoniae, a respiratory disease in pigs usually associated with substantial use of antimicrobials (Sacristán *et al.*, 2015). Use of APP vaccination would be expected to show a decrease in need for antimicrobial treatment in herds with problems related to APP. However, the effect of the vaccine against APP is not well documented outside clinical trials.

Based on observational data, the objective of this study was to determine whether use of vaccination against APP in piglets had an effect on the antimicrobial consumption in finisher pigs, when compared to herds without vaccination.

Material and Methods

Data on purchase of vaccines and antimicrobial use between 2005 and 2014 were extracted from the Danish VetStat database in which prescriptions of medication for livestock use are recorded. Initiation of vaccination was the first registration of purchase of vaccines against APP for the sow unit. Antimicrobial use was extracted from the finisher units receiving piglets from the vaccinated sow unit. Antimicrobial use was calculated as Animal Daily Doses (ADD) based on the amount prescribed, recommended dose and standard bodyweight for finisher pigs (50 kilo) using this equation:

The study period covered 8 months before until 14 month after vaccination was initiated. Data from initiation of vaccination until 6 months after was considered a transition period and was not included in the data. This period represents the time it takes from initiation of vaccination until all pigs in the finisher unit are vaccinated. Data were analysed using a multivariable linear regression model including selected risk factors. Among the risk factors was herd size, seasonal and yearly variation in antimicrobial consumption represented by the quarter and the year of the first purchase of vaccination for each herd. The outcome in the model was change in antimicrobial use, represented by the difference between antimicrobial consumption before vs. after vaccination was initiated. To evaluate whether the effect was due to vaccination, the same model was tested with antimicrobial data from finisher herds receiving pigs from sow units with no vaccination against APP applied. For these data, the change in a randomly selected period was included.

Results

Data on antimicrobial use in 101 herds with vaccinated finisher pigs were included in a multivariable linear regression model. There was a significant effect of baseline antimicrobial use; the higher the baseline, the larger the decrease in antimicrobial use after vaccination, as illustrated in figure 1.

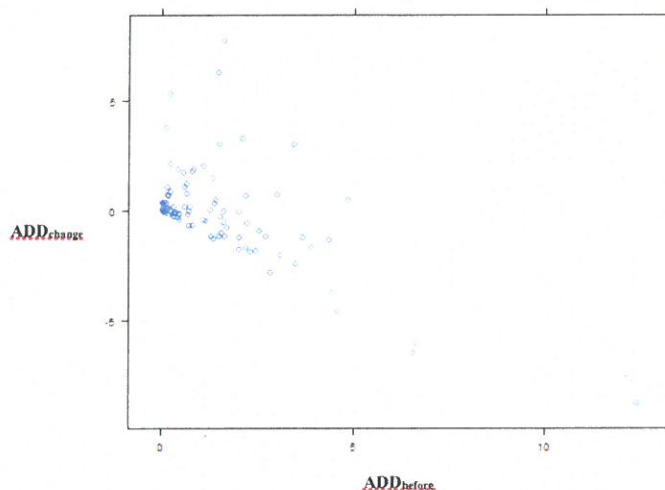


Figure 1. The change in antimicrobial use after vaccination was initiated (ADD_{change}) plotted against the baseline antimicrobial use before initiation of vaccination (ADD_{before}) for 101 herds. Each point represents data for an individual finisher herd receiving pigs from a vaccinated sow unit.

Data on antimicrobial use in 320 herds with non-vaccinated finisher pigs were included in a similar model, showing also a significant effect of baseline antimicrobial use.

$$\text{Final model for vaccinated herds: } ADD_{change} = 0.9 - 0.7 \cdot ADD_{before}$$

$$\text{Final model for non-vaccinated herds: } ADD_{change} = 1.1 - 0.65 \cdot ADD_{before}$$

Discussion

In this study we found that the change in antimicrobial use after vaccination against *APP* was significantly associated with the baseline antimicrobial use. The same effect was seen when looking at change in antimicrobial use for herds without vaccination against *APP*. In Denmark, as well as in many other countries, there has been much focus on reducing antimicrobial use in pig production. Thus, it was expected that the antimicrobial use in herds with high baseline would decrease over time, regardless of vaccination status. When comparing the model for herds with vaccinated pigs, and the model for herds with non-vaccinated pigs, we can see a difference, indicating a larger decrease in antimicrobial use in vaccinated herds.

In this study the disease status of the herds or the reason for initiating vaccination was non-known. Though, we could argue that herds with high antimicrobial use before vaccination against *APP* was probably herds experiencing problems related to *APP*. On the other hand, antimicrobials are known to have a productivity enhancing effect, and therefore it is likely that the consumption of antimicrobials is not directly reflecting the disease status of the individual herd. Herds with low antimicrobial use prior to initiation of vaccination were

probably not experiencing any substantial disease problems. The reason for vaccination in these herds could instead be due to demands from trade partners or as a solely preventive measure. There was a tendency that herds with low antimicrobial use before vaccination experienced an increasing antimicrobial use after vaccination. This could be because the herds are facing problems with other pathogens resulting in a higher need for treatment with antimicrobial use.

It seems that there is a positive preventive effect of vaccination against *APP*, but it could be interesting to know more about the herds, and also whether other measures at herd level were taken to reduce the disease prevalence and thereby the antimicrobial use.

Conclusion

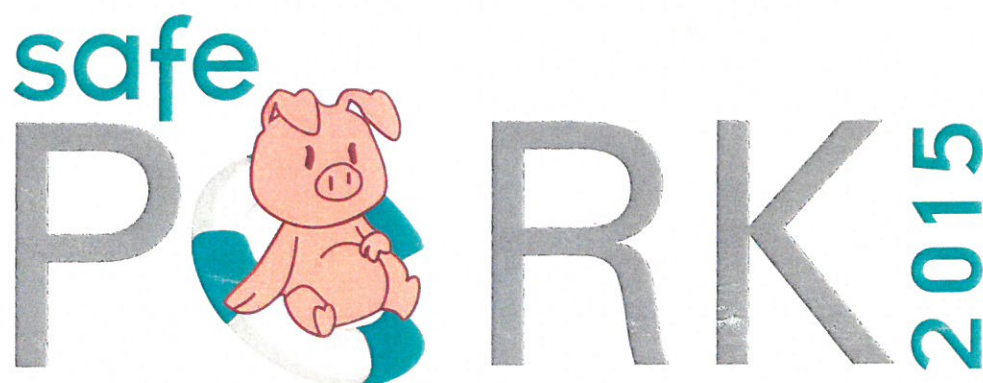
There was a significant effect of baseline antimicrobial use on the antimicrobial use after vaccination was initiated; the higher the baseline, the larger the decrease in antimicrobial use after vaccination. The decrease in antimicrobial used was more pronounced in vaccinated herds, indicating an effect of vaccination against *APP* in herds with high antimicrobial use related to *APP*.

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